

Final Project Report to the NYS IPM Program, Agricultural IPM 2000 – 2001

Title:

**EVALUATION OF PHEROMONE DISRUPTION IN COMBINATION
WITH INSECTICIDE APPLICATIONS FOR CONTROL OF PEACHTREE
BORERS IN PEACHES - YEAR 2**

Project Leader(s):

A. Agnello and D. Kain, Dept. of Entomology, NYSAES, Geneva, NY 14456

Type of grant:

Pheromones; biorationals; microbials; conventional pesticides

Project location(s):

Research location: Wayne Co. (Sodus and Williamson, NY)

Applicability: All of NY

Abstract:

The effectiveness of three different treatments were compared in the control of infestations and damage by peachtree borer (PTB) and lesser peachtree borer (LPTB) in commercial peach orchards: (1) pheromone disruption dispensers combined with directed trunk insecticide applications; (2) pheromone disruption dispensers only; (3) directed trunk insecticide applications only. Pheromone dispensers were placed in blocks (2–3 acres) of peaches on two farms in Wayne Co., and insecticide treatments were applied to single-tree plots in each block. These insecticide sprays were also applied to comparable trees in another planting at each farm not containing the pheromone dispensers. The effectiveness of the different treatments was evaluated by comparing adult male trap catches in pheromone traps in each block, postharvest excavating around the trunks to search for borers and damage in the fall, and enclosing infested cankers with sleeve cages to assess adult emergence at the end of the season. Pheromone trap catches of both borer species were completely suppressed by the pheromone dispensers in the disrupted plots. Fall 2000 trunk inspection revealed no damage attributable to PTB infestation in either the test trees or the untreated checks. In 2001, very low levels of damage were found in all plots, but there were no treatment differences. On unsprayed trees caged during 2001, higher numbers of LPTB pupal cases were found in non-disrupted peach blocks than in blocks treated with pheromones. Damaged areas on sprayed vs. unsprayed trees will be caged in 2002. Results will be used to assess the advisability of using pheromone mating disruption as a borer management strategy in commercial peach orchards.

Background and justification:

In New York, there are two species of sesiid (clearwing) moths that attack peaches — the peachtree borer, *Synanthedon exitiosa*, and the lesser peachtree borer, *Synanthedon pictipes*. The adult borers are striking clear-winged moths with yellow and steel-blue body markings. The adults of these insects have from one to four yellow-orange stripes across the abdomen, depending upon species and sex. The PTB enters the tree near soil level and does not require the presence of wounds or breaks in the bark for entry, but the LPTB nearly always enters the tree at a pruning scar, canker, mechanical injury, or winter-injured area. Both species pass the

winter as borers inside the tree, and in the spring emerge as moths that lay eggs on or in the trunk during the summer. In New York, the LPTB moth emerges first, in late May, and the PTB doesn't show up until mid-June; both stay active (laying eggs) through August. When the borer stages hatch, the PTB tends to crawl down the tree to soil level and burrow in there, but the LPTB will move to the nearest injured area, which may be on the lower trunk or just as easily up in the scaffold limbs. LPTB completes its development in one year, but some PTB larvae take two years to develop, so any control measure a grower would elect will require repeating for at least 2–3 years.

Injury is caused by larval feeding on the cambium and inner bark of the trunk close to the soil level (PTB) or on the upper trunk and lower scaffold branches (LPTB). Occasionally, larger roots are also attacked by PTB. Areas attacked often have masses of gum, mixed with frass, exuding from the bark. All ages of trees are injured. Young trees are at times completely girdled and subsequently die. Older trees are often so severely injured that their vitality is lowered and they are rendered especially susceptible to attack by other insects or by diseases. Although both species may be found in infested trees, younger plantings and those not afflicted by extensive cankers or other bark splits are attacked primarily by PTB. Control is difficult, owing to the concealed habit of the larvae, and most growers must rely on one or more coarse insecticide sprays of the trunks and lower scaffold branches to deter egg laying and kill newly established larvae. Because this is a labor-intensive measure that often fails to completely control these pests, many growers choose not to elect treatment, or else do an incomplete job, with the intention of getting what they can out of a planting until infestations combine with other peach production factors to warrant tree removal. This approach has been common in the recent past, during which there has been little demand for New York stone fruits outside of local farmstand markets. However, with a recent increase in the planting of new peach varieties and short-range distribution to other markets, there is now more interest in examining currently available pheromone disruption tools for the control of these perennial pests.

This research involved trials testing the efficacy of pheromone disruption with and without directed trunk sprays, and here we report our findings after the second of a 2-year trial, in order to establish reliable guidelines for the use of mating disruption against these pests in commercial New York plantings.

Objectives:

1. To compare the effectiveness of different treatments (pheromone disruption, directed trunk insecticide sprays, and pheromone /insecticide in combination) in controlling infestations and reducing trunk damage to peach trees by two species of clearwing borers during successive growing seasons; also, to evaluate the relationship of trap catch in pheromone-disrupted peach orchards and the level of tree infestations by peachtree borers over a period of 2–3 years.

Procedures:

1. This was multi-year trial in commercial orchards having serious annual problems with borers. Because we were targeting both lesser peachtree borer and peachtree borer, we selected orchards infected with cankers (necessary for LPTB). Trials were conducted at two locations in Wayne Co., Furber (Sodus, NY) and Herman (Williamson, NY). In each location, we compared mating disruption versus no pheromone treatment in two separate orchards, each approximately 2.5 acres in size. We further selected a group of 10 trees in each of these orchards for treatment with insecticide using directed trunk sprays, so the following treatments were evaluated:

- 1 - Pheromone disrupted+trunk spray
- 2 - Pheromone disrupted, no trunk spray

- 3 - Non-disrupted+trunk spray
- 4 - Non-disrupted, no trunk spray

On 31 May (2000) and 22-23 May (2001), Shin-Etsu Isomate-L ties containing a 30:70 blend of (Z,Z):(E,Z)-3,13-octadecadienyl acetate were placed in the test blocks at a rate of approximately 200/acre (1/tree). This blend is formulated to be appropriate for disruption of both borers in situations where LPTB is the predominant species, such as we believed to be the case at these sites. On these same dates, three wing-style (Pherocon) traps baited with pheromone lures (Scentry) for each species were hung in the interior of each disrupted and non-disrupted block; traps were checked twice per week from early June through August each year. On 22-28 May, 2001, screen cages made out of greenhouse netting (SolarGard, Griffin Premium Knitted 40% shade cloth, Tewksbury, MA) were used to enclose 2 canker / damage sites on the branches and 1 site on the trunk of each of 10 unsprayed trees in each plot.

Insecticide treatments consisted of directed trunk sprays of Asana (4.0 oz / 100 gal) applied three times during the season. In 2000, 2 June, 6-7 July, and 20 Sept (postharvest); and in 2001, 13 June, 18 July, and 19 Sept (postharvest), using a Nifty Pul-Tank handgun sprayer operating at a pump pressure of 150 psi. Applications of approximately 1.25 gal per tree were made to single-tree plots, and replicated 10 times per block.

In the fall, from 13-27 Oct (2000) and 10-11 Oct (2001), trees were examined for PTB larvae and larval damage. The bases of the trunks on all the sprayed trees, plus an equal number of unsprayed trees in each block, were excavated around their entire circumference to a depth of 3-6 inches. The surface of the trunk circumference was inspected for exudations of gum containing frass, as well as for exuviae of any PTB larvae evident in the excavation. In 2001, the fabric sleeve cages on each tree were also examined for emerged adults or pupal exuviae of LPTB.

Results and discussion:

The pheromone dispensers completely suppressed trap catches of both PTB and LPTB at both sites for both seasons, compared with relatively heavy flights noted in the non-disrupted comparison blocks (Figs. 1 and 2). Therefore, it may be concluded that this pheromone treatment was highly successful in disrupting the chemical communication of males and females in these two species. The PTB pheromone traps did regularly catch small numbers of a related species, determined to be lilac / ash borer, *Podosesia syringae*, which is not an economic pest of stone fruits.

The tree trunk inspections in 2000 turned up no evidence of any PTB larvae or gum exudations resulting from infestations, in both the treated and untreated trees. In 2001, very low levels of damage were detected that were consistent with PTB entry sites, although no empty pupal cases were found, and no significant differences were seen among any of the treatments (Table 1). These results were not entirely unanticipated, as the previous year's inspection implied that the incidence of this species was relatively low in these blocks, and any damage noted might have been caused by the small number of specimens that could have been in the trunk tissue from infestation during the year before this study began.

Inspection of the sleeve cages enclosing canker and damage sites on the trees revealed numerically higher numbers of LPTB pupal cases in the non-disrupted blocks than in those treated with the pheromones, although the difference was significant only at the Herman site. This is further argument for the effectiveness of the pheromone dispensers in disrupting the sexual behavior of this species to a noticeable degree. Although the Isomate-L label does not actually claim effectiveness against PTB, anecdotal evidence from a number of researchers

corroborates that low-level populations of this species are generally also controlled by this formulation.

Table 1. Infestation^a of peachtree and lesser peachtree borers as determined by fall trunk inspections, 2001.

Block/Treatment	PTB trunk injury sites		LPTB pupal exuviae		
	Sprayed	Unsprayed	Mean avg. no./tree	Proportion on trunk	scaffolds
Furber					
Pheromone	0.1 a	0.3 a	0.1 a	1.0	0.0
No pheromone	0.1 a	0.1 a	0.7 a	1.0	0.0
Herman					
Pheromone	0.0 a	0.2 a	0.2 a	0.5	0.5
No pheromone	0.2 a	0.1 a	2.1 b	0.5	0.5

^a Values in the same column followed by the same letter not significantly different ($P = 0.05$, Fisher's Protected lsd test).

In the spring of 2002, screen cages again will be used to enclose cankers found on scaffold branches prior to first emergence of LPTB and PTB adults, this time using the trees that have been previously treated with insecticide sprays (and compared with other unsprayed trees), to assess the relative effectiveness of this combined treatment on LPTB moth emergence.

- Portions of the project that are ready for implementation. After two seasons of these trials, there is sufficient evidence to determine that pheromone disruption alone is able to provide adequate protection from infestation in commercial plantings, at a level that is comparable if not superior to that achievable using pesticide trunk sprays. Also, the pheromone dispensers tested are already labeled and available in NY, so access to the treatment materials should not be an issue.
- Portions of the project that are in need of commercial-level testing before full implementation can take place. N/a, although I would be interested in following the progress in peach or cherry orchards where this tactic is being adopted for the first time, in order to gather further information on its utility in NY fruit production systems.
- Portions of the project that require more research. In the spring of 2002, screen cages again will be used to enclose cankers found on scaffold branches prior to first emergence of LPTB and PTB adults, this time using the trees that have been previously treated with insecticide sprays (and compared with other unsprayed trees), to assess the relative effectiveness of this combined treatment on LPTB moth emergence. This last component of the study could also provide information on whether a combined insecticide+pheromone approach would be any more effective in cases of severe infestation such as on these farms.
- Reductions in pesticide use that will result from implementation of the research. Growers who adopt the practice of using pheromone ties in place of insecticide sprays for control of their peachtree borers can cut their annual pesticide use by 1–3 applications per season, depending on their normal management practices for this class of pests.

- Estimates of the cost of implementation. Costs of implementation are limited to the cost of the ties (probably ~\$40/acre) and the labor required to deploy them, which we estimate to be 1 worker-hour/acre. In total, this is probably no more expensive than the cost of 2 pesticide sprays (including application costs and labor).
- Increased grower profitability that might result from implementation. If this tactic is used each year (and it is simple enough that growers may in fact be more motivated to do use mating disruption than trunk sprays), there is a strong likelihood that they will achieve a higher level of borer control than is normally the case. This could translate into a longer productive orchard life before the trees need to be taken out, which would increase overall farm profitability in the long term.
- Analysis of what needs to be done to assure that the research will be implemented. Recommendations on the use of this tactic have been added to the 2002 Pest Management Guidelines for Commercial Tree Fruit. Additionally, this research and its application will be discussed in presentations given during the winter at county stone fruit schools.
- How the new knowledge adds to the current pest management knowledge-base. This project serves as a contribution in the overall effort to bring our stone fruit pest management recommendations more up to date than they have been in the recent past, by both proposing a more sustainable control approach for a serious class of pests, and by improving the practicality (= profitability) of growing peaches and other affected stone fruits as an alternative crop.

Samples of materials

A copy of this report together with a series of digital photos has been sent to Jill Shultz for potential use in a newsletter or bulletin article highlighting some of this year's IPM research projects.

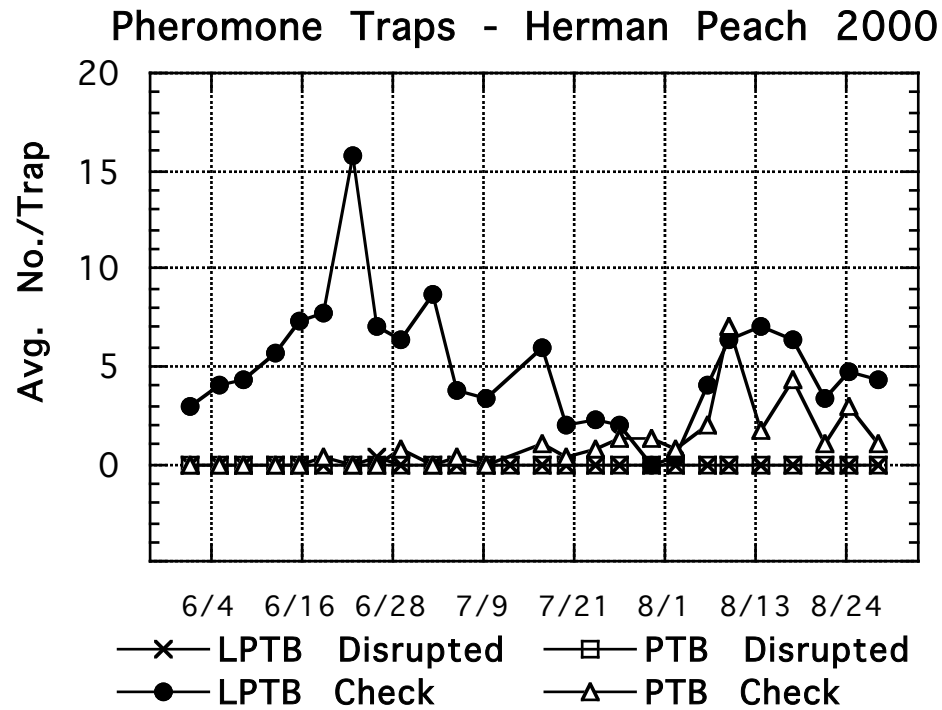
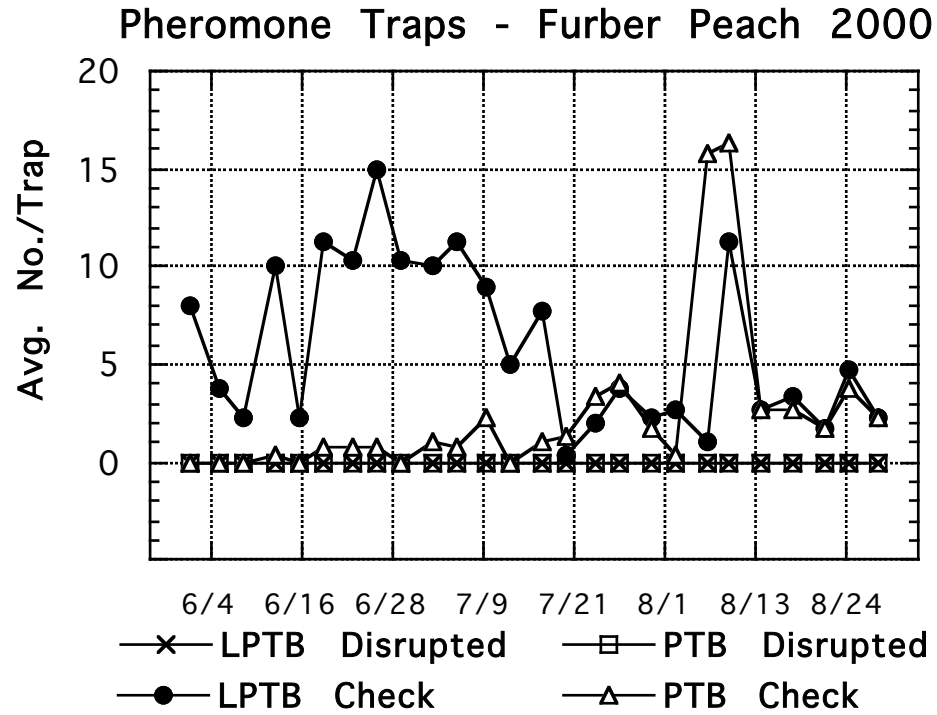
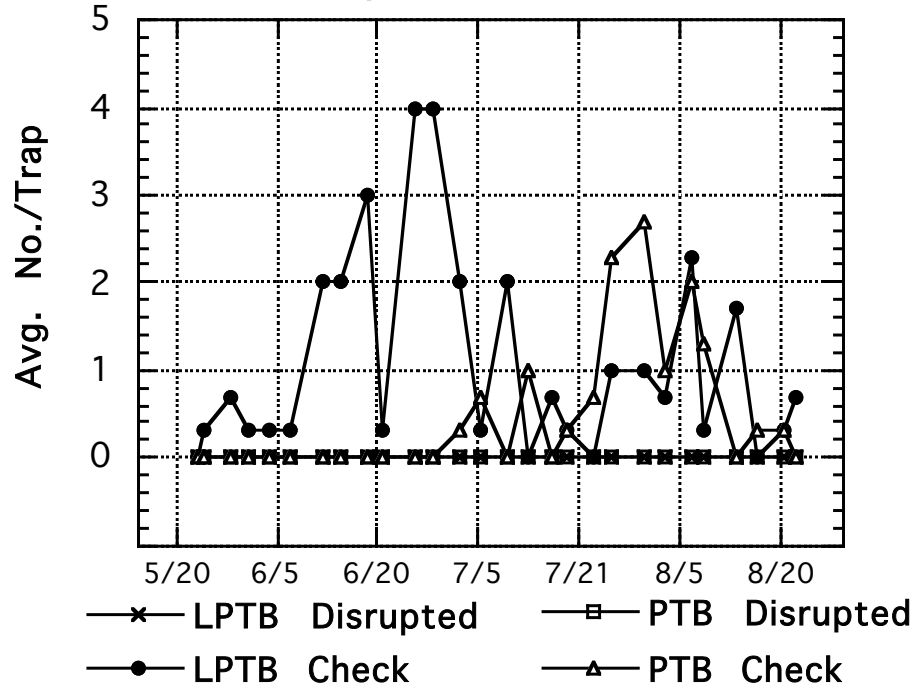


Fig. 1. Pheromone trap catches of lesser peachtree borer (LPTB) and peachtree borer (PTB) moths in pheromone-disrupted and non-disrupted peach plantings in Wayne Co., 2000.

Pheromone Traps - Furber Peach 2001



Pheromone Traps - Herman Peach 2001

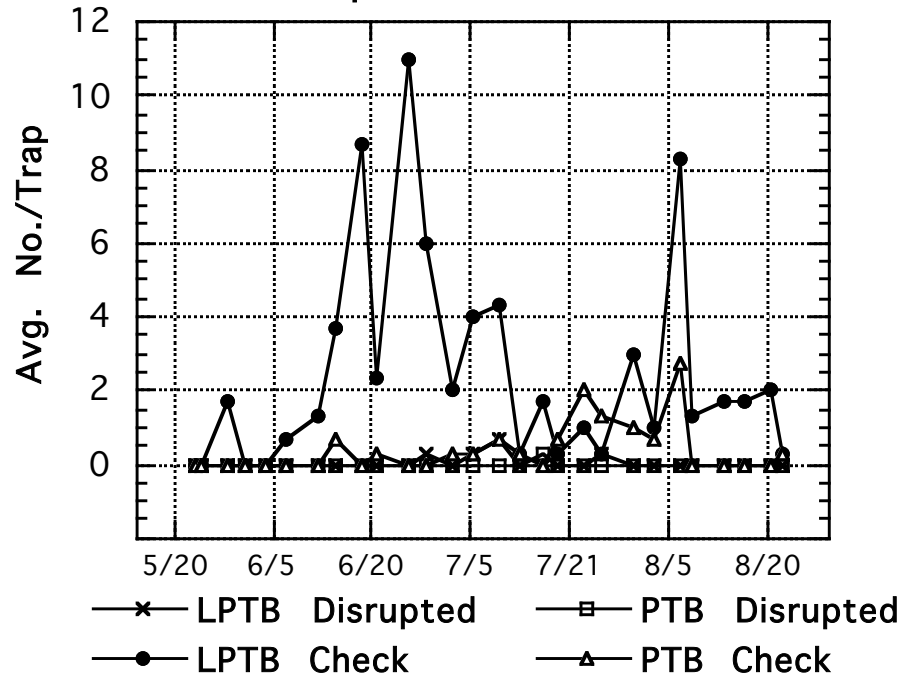


Fig. 2. Pheromone trap catches of lesser peachtree borer (LPTB) and peachtree borer (PTB) moths in pheromone-disrupted and non-disrupted peach plantings in Wayne Co., 2001.